CLAIMS

1. A method for detecting an endpoint during a chemical mechanical polishing (CMP) process, comprising the operations of:

receiving a reflected spectrum data sample comprising a plurality of values corresponding to a plurality of spectrums of light reflected from an illuminated portion of a surface of a wafer;

extrapolating outside spectrum data using a linear combination of the values of the reflected spectrum data sample; and

determining an endpoint based on optical interference occurring in the reflected spectrum data.

2. A method as recited in claim 1, further comprising the operation of decomposing the reflected spectrum data sample into noise sub-space values and signal sub-space values.

3. A method as recited in claim 2, wherein the reflected spectrum data sample is decomposed using a singular value decomposition.

4. A method as recited in claim 3, further comprising the operation of truncating the noise sub-space values.

5. A method as recited in claim 1, wherein the optical interference is a result of phase differences in light reflected from different layers of the wafer.

6. A method as recited in claim 5, wherein the optical interference occurs when a top metal layer is reduced to a thin metal zone.

7. A method as recited in claim 6, further comprising the operation of determining when oscillations occur in a plot of wave-numbers based on the reflected spectrum data.

8. A method as recited in claim 7, wherein the endpoint occurs when the oscillations in the plot of wave-numbers occurs.

9. A method as recited in claim 8, further comprising the operation of obtaining linear prediction power data in a defined spectral range based on the wave-numbers.

10. A method as recited in claim 9, further comprising the operation of calculating a sum of peak magnitudes occurring in the linear prediction power data.

11. A method as recited in claim 10, further comprising the operation of selecting an endpoint when the sum of the peak magnitudes exceeds a predetermined threshold.

12. An endpoint detection apparatus for detecting an endpoint during a chemical mechanical polishing process, comprising:

a broad band light source for illuminating a portion of a surface of a wafer;

an optical detector for receiving reflected spectrum data sample comprising a plurality of values corresponding to a plurality of spectrums of light reflected from the illuminated portion of the surface of the wafer;

logic that extrapolating outside spectrum data using a linear combination of the values of the reflected spectrum data sample; and

logic that determines an endpoint based on optical interference occurring in the reflected spectrum data.

13. An endpoint detection apparatus as recited in claim 12, further comprising logic that decomposes the reflected spectrum data sample into noise sub-space values and signal sub-space values.

14. An endpoint detection apparatus as recited in claim 13, wherein the reflected spectrum data sample is decomposed using a singular value decomposition.

15. An endpoint detection apparatus as recited in claim 14, further comprising logic that truncates the noise sub-space values.

16. A method for detecting an endpoint during a chemical mechanical polishing (CMP) process, comprising the operations of:

receiving a reflected spectrum data sample comprising a plurality of values corresponding to a plurality of spectrums of light reflected from an illuminated portion of a surface of a wafer;

decomposing the reflected spectrum data sample into noise sub-space values and signal sub-space values;

truncating the noise sub-space values;

extrapolating outside spectrum data using a linear combination of the values of the reflected spectrum data sample; and

determining an endpoint based on optical interference occurring in the reflected spectrum data.

17. A method as recited in claim 16, wherein the reflected spectrum data sample is decomposed using a singular value decomposition.

18. A method as recited in claim 17, wherein the optical interference is a result of phase differences in light reflected from different layers of the wafer.

19. A method as recited in claim 18, further comprising the operation of determining when oscillations occur in a plot of wave-numbers based on the reflected spectrum data.

20. A method as recited in claim 19, wherein the endpoint occurs when the oscillations in the plot of wave-numbers occurs.